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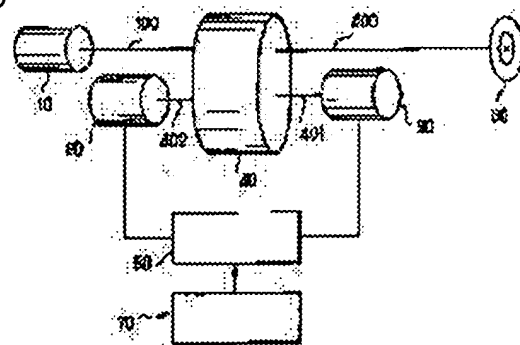
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(54) OUTPUT TRANSMISSION DEVICE FOR AUTOMOBILE

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a device transmitting two powers electrically without using an output battery.

SOLUTION: A device which transmits an output between an engine 10 of an automobile and wheels 80 comprises two electric parts 20 and 30, a mechanical assembly 40 joining the engine 10 and the two electric parts, a connecting device 50 passing an electric output between the two electric parts, and a control device 70 generating a command to the connecting device and controlling an induction of the electric output from the engine to the electric parts. The connecting device 50 guarantees direct passing of the electric output between the two electric parts without intermediate of a part storing or discharging high energy. The control device 70 also controls the connecting device 50 so that the both electric parts correspond to requirement of a driving device in such a way that an output generated by one electric part is immediately consumed by the other electric part.



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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the output transport unit for automobiles for transmitting an output between the engine of an automobile, and a wheel using an electrical part.

[0002]

[Description of the Prior Art] The output transport unit for automobiles of the mold which sketched in drawing 1 is well-known.

[0003] This automobile contains an engine 1 and two electrical parts 2 and 3.

[0004] An engine 1 and two electrical parts 2 and 3 are mutually connected through the epicycloid gear train 4.

[0005] Therefore, an engine 1, the gear change electrical part 2, and the drive electrical part 3 are connected with the gear train 4 through shaft 1a, shaft 4c, and shaft 4a, respectively.

[0006] Inverter 2a is together put to the gear change electrical part 2, and inverter 3a is together put to the drive electrical part 3.

[0007] The direct-current feeder of these two inverters 2a and 3a is mutually connected by the high-pressure bus 5.

[0008] Moreover, a bus 5 is connected to the high-pressure dc-battery 6.

[0009] Command equipment 2b and 3b are connected to each inverter 2a and 3a.

[0010] It has the control unit 7 for finally controlling two command equipment 2bs and 3b if needed for a driving gear.

[0011] Arrow-head 7a shows the input signal of a control unit 7, and this input signal expresses the initial complement of the driving gear corresponding to whenever [accelerator pedal treading-in-].

[0012] Arrow heads 7b and 7c are the output signals of a control device 7, and these signals are useful to operating command equipment 2b of Inverters 2a and 3a, and 3b, respectively.

[0013] Although a part of the output is mechanically transmitted to a wheel 8 direct again through shaft 1a, the gear train 4, shaft 4a, and shaft 4b that connects the gearing electrical part 3 with a wheel 8 when an engine operates, "splitting" of other parts of engine power is carried out by the electric apparatus which consists of two electrical parts 2 and 3 and two inverters 2a and 3a.

[0014] The output transmitted to a wheel according to a this "output splitting" operation can be modulated.

[0015] Thus, the output transmitted to the gear change electrical part 2 can be transmitted to the high-pressure dc-battery 6 or the drive electrical part 3 according to the predetermined algorithm carried out by the control device 7 for example, depending on an operation style from an engine 1.

[0016] Furthermore on the occasion of a moderation phase, the drive electrical part 3 drives by the wheel 8. In this case, the drive electrical part 3 can act as an electric organ, and can transmit that output to a dc-battery 6.

[0017] It is not necessary to use a gear change gear box mechanical [this type of structure], or automatic, and since knocking in a travelling direction is avoided, operation comfortable nature is guaranteed.

[0018] The main trouble of this structure is existence of the high-pressure dc-battery 6.

[0019] This component occupies comparatively big cost to the whole automobile cost.

[0020] Moreover, this structure is accompanied by risk to a driver on the occasion of a maintenance break in in case of accident.

[0021] Therefore, in order to protect a driver from electric contact, it must have a safeguard for preventing unrestricted discharge of a dc-battery on the occasion of an accident short circuit.

[0022] Therefore, it must have a high-voltage contact, a fuse, and an electric shielding high-tension cable.

[0023] This needs excessive cost again.

[0024] The output voltage of a dc-battery 6 is not still more fixed. This output voltage is changed in for 240 volts and 400 volts.

[0025] If it does not devise appropriately that an inverter is equal to such a high voltage and its fluctuation, *****, and the size and cost of these inverters serve as size comparatively.

[0026] Therefore, existence of a high power dc-battery brings about the trouble on the insurance over a driver, and increase of the cost of an automobile.

[0027] Therefore, the purpose of this invention is to solve these troubles, holding operation comfortable nature without knocking, and the outstanding effectiveness.

[0028] The solution by this invention abolishes an output dc-battery, and is to control an output transport unit by the special approach.

[0029]

[Means for Solving the Problem] Therefore, the mechanical assembly with which this invention connects two electrical parts, and an engine and the two aforementioned electrical parts, The contact which passes an electrical output between said two electrical parts, In the equipment which transmits an output between the engines of an automobile and wheels containing the control device for generating a command to said contact and controlling induction of the electrical output from an engine to an electrical part again The aforementioned contact guarantees passage of the direct electrical output between said two electrical parts without mediation of a big energy storage or discharge components. Moreover, said control unit It is related with the equipment which transmits an output between the engines of an automobile and wheels which are characterized by controlling said contact so that the output generated by one electrical part is immediately consumed with the electrical part of another side and both electrical parts correspond to the need for a driving gear.

[0030] In this specification and a claim, an expression "large energy storage (or discharge)" shall mean the storage (or discharge) by components, such as a dc-battery, and an expression "small energy storage (or discharge)" shall mean the storage (or discharge) by components, such as a capacitor, to this.

[0031] a specific operative condition -- two static energy conversion machines which are set like and by which the contact between said two electrical parts was connected mutually -- containing -- each aforementioned energy conversion machine -- respectively -- while is accomplished so that it may be combined with an electrical part, and said control unit may act on the 1st converter so that the electrical output generated by one converter may be immediately consumed by the converter of another side, and it may act on the 2nd converter if needed for a driving gear.

[0032] Preferably, the direct-current supply line of said two transducers is used for control of the signal showing the electrical potential difference which was mutually connected through the high-pressure bus, and was measured among 2 lines of a bus of the 1st transducer.

[0033] The signal showing the electrical potential difference on said bus accomplishes the 1st input of a control unit preferably, including a comparator for this control unit to compare this signal with a standard signal, the output signal of this comparator is transmitted to the amendment means of a low-pass filter mold, the output signal of this filter is transmitted to the command means of the 1st converter, and the output of this command means accomplishes the 1st output of a control unit.

[0034] Moreover, the signal showing the need for a driving gear accomplishes the 2nd input of a control unit preferably, including a processing means, the output signal of this processing means is transmitted to the command means of the 2nd converter, and, as for this equipment, the output of this command means accomplishes the 2nd output of a control unit.

[0035] The signal showing the need for a driving gear is the function of whenever [accelerator pedal treading-in-].

[0036] In a desirable example, the mechanical assembly which connects an engine and two electrical parts is the epicyclic gear train.

[0037] The output transport unit by this invention contains at least one capacitor among 2 lines of a bus preferably.

[0038] Moreover, including the dc-battery by which the output transport unit by this invention was connected to the bus through mediation equipment, this dc-battery is accomplished so that electric power may be supplied to one [at least] electrical part, in order to guarantee engine starting.

[0039] Preferably, said mediation equipment contains at least one diode arranged so that the output current bundle of a

dc-battery may be sent toward a bus.

[0040] According to the desirable embodiment, each diode is arranged for mediation equipment between a dc-battery and one bus including two diodes, and such diodes are arranged so that the output current bundle of a dc-battery may be sent toward a bus, and they guarantee the safety of those who may do in this way and may contact one line of a bus accidentally.

[0041] Preferably, it is fixed to 42 volts, and the electrical potential difference of said dc-battery is carried out in this way, and guarantees 42-volt electric supply to the circuit on an automobile.

[0042] Finally, in order to supply for it electric power or charge the auxiliary device on a vehicle, the high-pressure-low voltage converter connected to the bus is included.

[0043] Moreover, this invention relates to the automobile equipped with the above output transport units.

[0044] This invention is not limited by these examples although the example which shows this invention to a drawing is hereafter explained to a detail.

[0045]

[Embodiment of the Invention] The output transport unit by this invention of the illustration to drawing 2 is devised for [which has an engine 10] automobiles.

[0046] This output transport unit contains two electrical parts 20 and 30 arranged at juxtaposition.

[0047] An engine 10 and electrical parts 20 and 30 are mutually connected with the mechanical assembly 40.

[0048] In more detail, a shaft 100 connects an engine 10 with the mechanical assembly 40, and a shaft 402 connects the gear change electrical part 20 with the assembly assembly 40, and a shaft 401 connects the drive electrical part 30 with this mechanical assembly 40.

[0049] The connection between the mechanical assembly 40 and a wheel 80 is guaranteed with a shaft 400.

[0050] Two electrical parts 20 and 30 are mutually connected by the contact 50, and this contact 50 is controlled by the control unit 70.

[0051] When an engine 10 operates, the output to generate is transmitted to the mechanical assembly 40 through a shaft 100. Although a part of this output is directly transmitted to a wheel 80 through a shaft 400, other parts of this output are guided by the electric apparatus which consists of two electrical parts 20 and 30, a contact 50, and a control unit 70.

[0052] After the essential character of a contact 50 fits an electrical output depending on the case, it is made to be to pass among electrical parts 20 and 30, and moreover, this is carried out, without needing a big energy storage parts intermedia article like the output dc-battery 6 of illustration for drawing 1 .

[0053] Since the contact 50 is not equipped with storage thru/or the discharge components of energy, while the output by which **** generating was carried out is immediately consumed by one electrical part with the electrical part of another side, it is devised as a control unit 70 controlling a contact 50 so that these electrical parts may correspond to the need for a driving gear.

[0054] The example of the output transport unit by this invention is explained about drawing 3 in the following.

[0055] In this example, the mechanical assembly which connects an engine and two electrical parts mutually is constituted by the epicycloid gear train 41.

[0056] The components of the output transport unit of the illustration to drawing 2 and all similar components have a same reference figure.

[0057] Namely, the output which the engine 10 was connected with the epicycloid gear train 41 through the shaft 101, and was generated by the engine 10 lets the epicycloid gear train 41 pass. On the other hand, it is directly transmitted to a wheel 80 with a shaft 410. On the other hand It is transmitted to the gear change electrical part 20 with a shaft 412, and this output is transmitted to the drive electrical part 30 through the output transport unit which consists of the contact 50 explained to a detail in the following, and a control unit 70, and this drive electrical part 30 is connected with the wheel with the shaft 411.

[0058] In the example of drawing 3 , including two static energy transducers, as for these transducers, the form of two inverters 52 and 53 is accomplished, and, as for the contact 50, each inverter is combined with the electrical parts 20 and 30 which are one side, respectively.

[0059] Furthermore, these two inverters 52 and 53 are mutually connected by that direct-current feeder 520,530, these direct-current feeders are connected to a bus 51, and two lines of this bus have the reference figure 510,511, respectively.

[0060] The contact 50 does not equip drawing 3 with the output dc-battery like illustration.

[0061] Therefore, the full power to inverters 52 and 53 which is equal to zero as for the sum total of two direct currents, or is generated by one inverter, and is supplied to a bus 51 must be immediately consumed by the inverter of another side.

[0062] This means that the electrical potential difference on a bus or the electrical potential difference between two lines 510,511 of a bus must be held at constant value.

[0063] In order to fulfill such conditions, the output transport unit by this invention contains a special control unit which is described below.

[0064] This control unit 70 has two inputs 71 and 72 and two outputs 73 and 74.

[0065] The 1st output 73 is connected to the inverter 53 combined with the drive electrical part 30.

[0066] The 2nd output 74 is connected to the inverter 52 combined with the gear change electrical part 20.

[0067] The output transport unit by this invention includes a means to measure the electrical potential difference between two lines 510 and 511 of a bus (not shown in drawing 3).

[0068] By this measurement means, the signal (VHTM) which shows the electrical potential difference on a bus is transmitted to the input 71 of a control unit 70.

[0069] Moreover, in a control unit 70, including a comparator 75, the 1st input 750 of this comparator is connected to the 1st input 71 of a control unit, and that 2nd input 751 receives the standard signal VHTR.

[0070] Then, a comparator 75 generates a signal in that output 752, this signal is transmitted to the processing means 76, and the output signal of the processing means 76 is transmitted to the command equipment 77 of an inverter 53.

[0071] Thus, in this example, since a control device 70 holds the electrical potential difference on a bus 50 uniformly, it can control the inverter 53 combined with the drive electrical part 30.

[0072] In practice, if the amplitude-measurement value (VHTM) on a bus is higher than a standard value (VHTR), it will depend for the command of an inverter 53 on the operating mode of the drive electrical part 30 as follows.

[0073] - If the drive electrical part 30 is in motor mode, an inverter 53 will be controlled by the control unit 70 to transform a lot of electric energy into mechanical energy.

[0074] - If the drive electrical part 30 is in electric organ mode, an inverter 53 will be controlled to transform more nearly little mechanical energy into electrical energy.

[0075] Of course, an inverter 53 will be controlled by hard flow if a value (VHTM) is lower than a standard value (VHTR).

[0076] The inverter 52 furthermore combined with the gear change electrical part 20 is controlled by the control unit 70 if needed for a driving gear.

[0077] In the example of the illustration to drawing 3 , a control unit 70 receives the signal which represents whenever [need / for a driving gear] to the 2nd input 72.

[0078] Especially this signal can be made into the function of whenever [accelerator pedal of automobile treading-in-].

[0079] This signal is transmitted to the processing means 78 from an input 72, and the output of this means 78 is connected to components and/or equipment 79. This command equipment 79 controls the inverter 52 combined with the gear change electrical part 20 by the signal transmitted on the output 74 of a control unit 70 if needed for a driving gear.

[0080] It is not limited to this embodiment, connection between the outputs 73 and 74 of a control device 70 and the inverters 52 and 53 of a contact 50 can be made the above and reverse, the inverter 53 combined with the drive electrical part 30 in this case can be controlled if needed for a driving gear, and this invention can be controlled so that the inverter 52 combined with the gear change electrical part 20 on that occasion holds the electrical potential difference on a bus 51 uniformly.

[0081] Thus, the equipment of this invention can avoid use of a high-pressure output dc-battery by using a special control device.

[0082] This can reduce the whole transmission cost and can avoid use with electric shielding and the high-pressure output contact of a high-tension cable, and a fuze by abolition of an output dc-battery.

[0083] Furthermore, since the electrical potential difference of a bus is held uniformly at 400-volt order, the size and cost of an inverter are reduced sharply. Moreover, increase of the value of direct-current high pressure to which electric power is supplied is useful to the size of an output inverter, and reduction of cost.

[0084] Furthermore, this output transport unit guarantees the continuity of two power transmitted to a wheel, and is fluctuated without fluctuation of a gear ratio at a rate. On account of the command fitted by the electrical part, expansion of two power transmitted to a wheel is very rapid, and continuous.

[0085] If it furthermore says from a consumptive viewpoint, in case this engine is operated so that an engine may be arranged at that optimal working point, the economical operation mode will be obtained.

[0086] It is enabled to use engine brake for the last until an automobile carries out the drop dead halt of this output transport unit. case [therefore,] the moderation demanded is not rapid -- an automobile -- a mechanical brake --
***** -- a full stop can be carried out without things and this makes it possible to prevent knocking completely.

[0087] Since it has little storage energy required for actuation of two inverters among these inverters preferably, at least one capacitor 54 is preferably connectable between two lines 510,511 of a bus 51.

[0088] The high-pressure-low voltage transducer 90 is connected to a bus 51 still more desirably.

[0089] This converter can supply electric power to the auxiliary equipment which it had on the automobile from the source of a high voltage direct current.

[0090] Engine starting is described in the following.

[0091] Conventionally, although a starter is used, in the case of this invention, engine starting is realized through one side of an electrical part. Therefore, the starter is unnecessary.

[0092] A means to start an engine by control of one electrical part is illustrated by drawing 4.

[0093] Since each part article of the illustration to this drawing 4 is already explained to the detail about drawing 3, it does not newly explain here.

[0094] A means to guarantee engine starting contains the service dc-battery 55 connected through diodes 56 and 57 between two lines 510,511 of a bus 51.

[0095] Moreover, this dc-battery 55 is connected to the high-pressure-low voltage transducer 90, and this transducer guarantees charge of a dc-battery.

[0096] When the volition which a driver makes leave an automobile is detected by the suitable means, starting of an engine 10 is carried out.

[0097] A control device 70 gives a command to either of two inverters 52 and 53 in that case.

[0098] Therefore, if it connects with a dc-battery 55 and an inverter 52 flows, this inverter 52 will start electric supply of the gear change electrical part 20.

[0099] This gear change electrical part 20 gives energy to an engine 10 through the mechanical assembly 40 or the epicycloid gear train 41.

[0100] The electrical potential difference of a dc-battery 55 is very low as compared with the high pressure which operates while a gear change electrical part runs. Although this electrical potential difference is about 12 volts or 42 volts, it is enough to rotate an engine 10 about 125 to 200 times per minute. Diodes 56 and 57 intercept a dc-battery 55 from the high pressure on a bus 51 after starting of an engine 10.

[0101] On the occasion of a halt phase, a suitable means detects the volition which a driver tends to make suspend an automobile. Then, an engine and two electrical parts can be stopped with a suitable command.

[0102] The electrical potential difference on a bus 51 is the high pressure of 400-volt order still more at this moment.

[0103] The capacitor 54 of one side or both discharges, and the terminal voltage falls. Diodes 56 and 57 intercept a dc-battery 55, before the terminal voltage amounts to far low level, for example, 12 volts, or 42 volts.

[0104] Then, an automobile can be put into operation as mentioned above.

[0105] If it can arrange and do so that the output bundle of the dc-battery to a bus can be controlled, it can also have single diodes, such as 56 or 57, between a dc-battery 55 and a bus 51. However, safety increases [the one equipped with two diodes]. Even if those who actually exist contact one line of a bus by chance and contact the car body (namely, body of an automobile) of an automobile at coincidence, the man does not have a possibility of receiving an electric shock. It is because one side of the path cord between a transducer 90 and a dc-battery 55 will be grounded (it generally sees in the dc-battery of an automobile like) and the diode of correspondence will intercept passage of an output, if it becomes without knowing why.

[0106] Finally, since the electrical potential difference of a dc-battery 55 is being fixed to 12 volts or 42 volts, in order to supply electric power to the circuit (12 volts or 42 volts) of an automobile, a dc-battery 55 can be used effectively.

[0107] The reference figure inserted after the terminology indicated in each claim is only for helping an understanding of these claims, and does not limit the range.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] The schematic diagram of the well-known output transport unit for automobiles

[Drawing 2] The schematic diagram showing an example of the output transport unit by this invention with which an engine and two electrical parts were connected with a certain mechanical assembly

[Drawing 3] The schematic diagram showing equipment similar to drawing 2 whose whole mechanical assembly is the epicycloid gear train

[Drawing 4] The schematic diagram showing the special embodiment of the output transport unit of this invention on which an electrical part can act as an engine starter

[Description of Notations]

1 Ten Engine

2 20 Gear change electrical part

2a, 3a Inverter

2b, 3b Command equipment

3 30 Drive electrical part

4, 40, 41 Mechanical assembly (epicycloid gear train)

5.51 Bus

510,511 Direct-current line of a bus 51

50 Contact

52 53 Inverter

54 Capacitor

55 Low Voltage Dc-battery

56.57 Diode

6 High-Pressure Dc-battery

7 70 Control unit

71 72 Input

75 Comparator

76 78 Processor

77 79 Command equipment

80 Wheel

90 High-Pressure-Low Voltage Converter

(VHTM) Signal which shows the electrical potential difference on a bus

(VHTR) Standard signal

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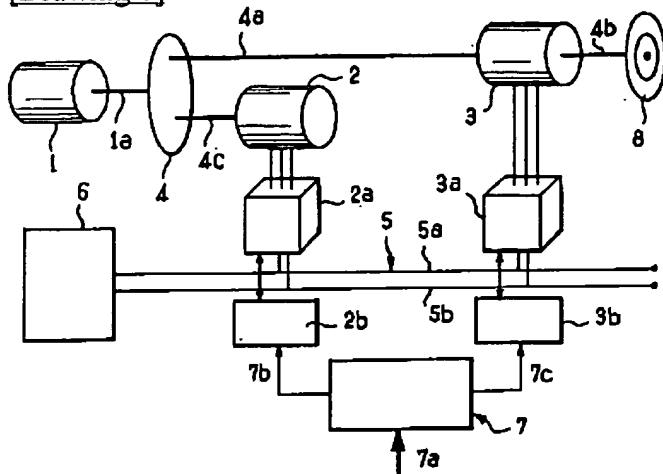
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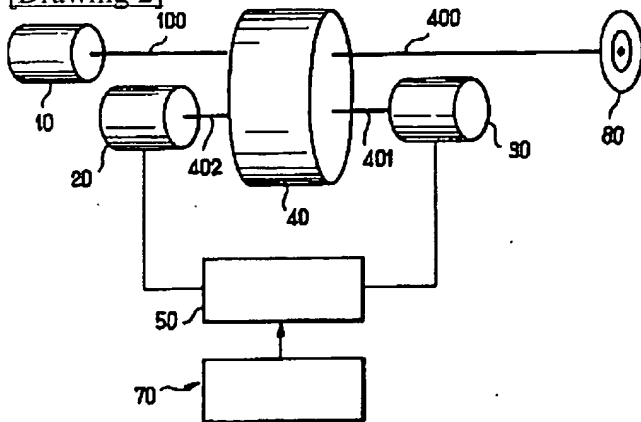
DRAWINGS

[Drawing 1]

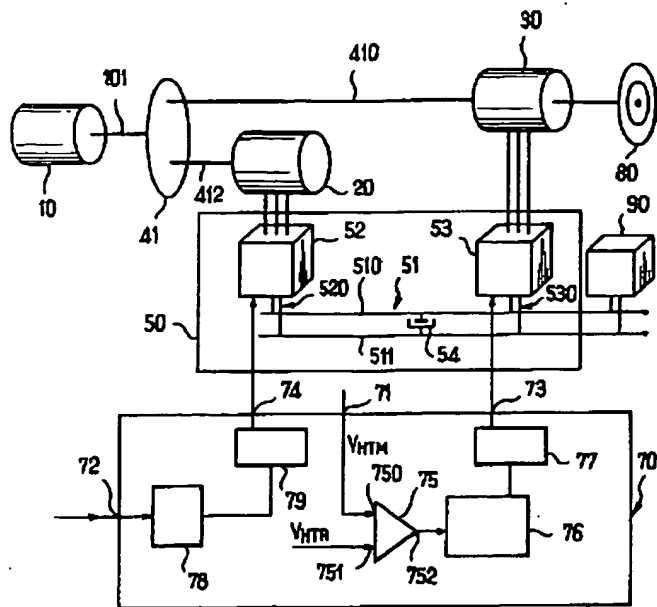


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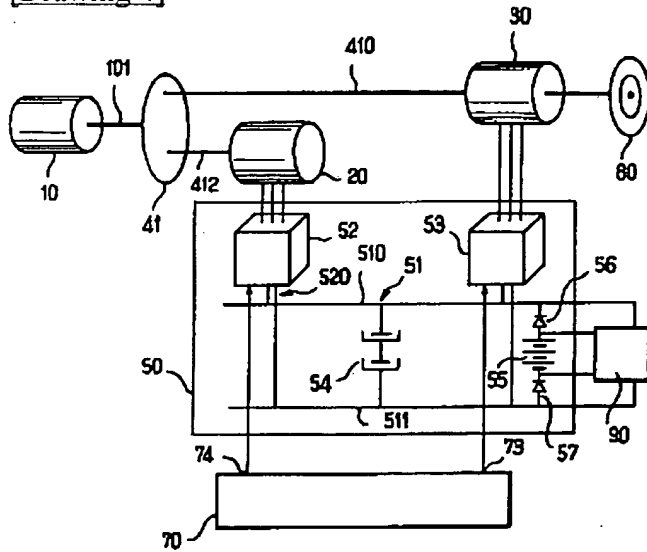
[Drawing 2]



[Drawing 3]



[Drawing 4]



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